## REMARKS/ARGUMENT

1) Claims 2-3, 6-16, 22-23 and 26-35 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants are quite surprised that the Examiner has restated the exact same rejection for Claims 2-3, 6-16, 22-23 and 26-35 that was set forth in the Office Action of February 22, 2005 without any discussion as to why Applicants amendments to Figures 2, 3, 5 and 6 and clarifying arguments regarding Claims 2-3, 6-16, 22-23 and 26-35, as set forth in the Amendment dated August 17, 2005, are inadequate to overcome the rejection.

Applicants once again respectfully point out that a detailed operation of Figure 1, which is the basis for Figures 2—6, is explained in U.S. Pub. No. US 2003/0035499 A1, which is incorporated by reference in its entirety ([paragraph 0024]). In this response Applicants will clarify the claims by pointing to the subject matter referred to in order to improve understanding of the material.

Claim 2: Examiner states it is unclear what the "high order filter devoid of amplifiers" on line 3 is and how the filters and the means for direct sampling on line 1 can implement the high filter devoice of amplifiers and how this limitation is read on the preferred embodiment or seen on the drawings. The same is true for claims 6, 22 and 26.

Applicants' response: Regarding the recitation, "a high order filter devoid of amplifiers", the cascaded stages do not have amplifiers between them. Looking at figure 2, 3, 5 and 6, it is quite apparent that higher than single order of IIR filtering is achievable with the presented invention **without using inter-stage amplifiers**. Inter-stage amplifiers

are **always needed to develop high order analog filters** in order to isolate the impact of loading. The current invention provides a means of obtaining high order IIR filters **without using any amplifiers**. Equations (25) and (27) drives this point home for second order IIR filter obtained without any amplifier separating the rotating and fixed capacitors. The "PIIR" stage, thus obtained can be cascaded without any separation with the amplifiers. One could place amplifiers between a cascade of multiple PIIR stages as shown in figure 4. The same is true for claims 6, 22 and 26.

Claim 3: Examiner states it is unclear how the recitation "means ... mixer" on lines 1-2 is read on the preferred embodiment. Insofar as understood, no such means is seen on the drawings . The same is true for claims 23 and 25.

Applicants' response: Regarding the recitation "mixer", Figure 4 shows the mixing operation quite clearly. The LO connected to the input sampling capacitor mixes the RF signal down to baseband frequency as shown in figure 4. For improving the clarity of the presentation, the figures show the LO connected to the input sampling switch. Following the down-conversion, PIIR filter stages perform high-order IIR filtering without using inter-stage IF amplifiers. This is described in great detail in US 2003/0035499 A1 and is referred to in the specification on page 5: line 1-9 and on page 16: lines 4-26. The same is true for claims 23 and 25.

Claim 7: Examiner states it is unclear how the filters can create a unit-directional flow of information, signal or charge, what they are and where they come from. The same is true for Claim 27.

Applicants' response: Regarding the recitation "uni-directional flow of information", this is described in [0027]. The charge comes from the RF current signal, is down-converted, sampled, processed by PIIR filter stages and handed off to an IF amplifier for further processing. The output of the final capacitor is read-out for further post-processing as shown in all figures.

This is further described on page 5: lines 11-30 and page 6: lines 1-11 (of the original application). The issue described is that input RF current is down-converted by LO through the input sampling switch shown in figure 2, 3, 4, 5 and 6 and integrated on CH+CR1. There are two banks of CR1. As CR1 is combined with CB1, the charge it holds is combined with the charge that pre-exists on CB1. When they are split again, each take on a new charge that is proportional to its size. In the next operation cycle, CR1+CH integrate the RF input current again and in doing so, the charge that pre-exists on CR1 is combined with CH creating a feedback from CB1 to CH. This is described on page 10: lines 7-11. To break this feedback, CR1 is RESET (meaning that the charge that exists on it is not forced to zero) every time prior to recombining with CH. Then there is no feedback from CB1 to CH and the charge flow is only from CH to CB1.
Now extending this to figure 3, of CR1 and CR2 are reset each time before the are combined back with CH and CB1, respectively, there will be no feedback from a later stage to an earlier stage, thereby creating a direction of signal flow from left to right only and no signal flow from right to left due to feedback.

Claim 8: Examiner states that the description of the present invention is incomplete because the capacitors and the capacitor banks are not connected to anything. Thus, the claimed capacitor and the capacitor banks may not perform the recited function. The same is true for Claim 28.

Applicants' response: The final output of the PIIR stages is connected to an IF amplifier. It is thereby converted from analog to digital and the information it carries is detected after digital post-processing. This is explained in US 2003/0035499 A1. One objective of the present invention is to show how to obtain a higher order IIR filter by cascading several IIR filter stages without requiring amplifiers in between the stages. The same is true for claim 28.

Claim 9: Examiner states that it is unclear how the capacitor can be "reset" since no means for performing the resetting function is recited in the claim. The same is true for Claim 29.

Applicants' response: The function of "resetting" the capacitor is shown in figure 6 and explained on page 8: lines 23-28, page 9: lines 1-10, 28-31, page 10: lines 1-11. The same is true for claim 29.

Claim 10: Examiner states that it is unclear how the recitation "comparator" and "negative feedback loop" is read on the preferred embodiment. Insofar as understood, no such loop and comparator are seen on the drawings. The same is true for claim 30.

Applicants' response: Figure 14 shows a generic sigma-delta A/D converter that is constructed using a loop filter followed by a comparator in a negative feedback loop. Claim 10 applies to the application of the cascaded PIIR filter based design of the loop filter part of the A/D converter. The cascaded IIR filter may be used to construct the loop filter of a sigma-delta A/D converter. The same is true for claim 32. This is also emphasized on page 2 of the specification in lines 8-13 for other applications of this invention also.

Claim 12: Examiner states that it is unclear how the RF input signal can be minus a negative feedback signal since no means for performing the subtracting function is recited in the claim. The same is true for claim 32.

Applicants' response: Figure 14 shows a generic sigma-delta A/D converter that is constructed using a loop filter followed by a comparator in a negative feedback loop. Claim 12 is related to the application of the cascaded PIIR filter based design of the loop filter part of the A/D converter when the input signal is an RF signal which is down-converted by the LO and consequently becomes a baseband signal. The down-conversion is shown by the mixer switch driven by "LO" in several figures in the specification. The cascaded IIR filter may be used to construct the loop filter of a sigma-delta A/D converter. The same is true for Claim 32. This is also emphasized on page 2 of the specification in lines 8-13 for other application of this invention.

The subtraction operation is performed by adding a negative contribution. Referring to Figure 14, the subtractor sign is realized by adding a negative current or charge packet 406 generated by the DAC. It is straightforward in practice to generate a negative contribution by inverting the current direction, swapping the positive and negative feeds of a differential signal or inverting the digital word input to the DAC. These methods are well known in the art. The details are presented in US 2003/0035499 (Figures 10, 11a, 16a, 16b, 20), which is incorporated in its entirety.

In addition to pointing out above how each of the claims is clear and definite, Applicants respectfully direct the Examiner to two Supreme Court cases in which the Court held that it is not necessary to recite in the claim everything necessary to operate the device. As stated by Joseph Gray Jackson in The Art of Drafting Patent Claims, 59-60:

> In *Deering v. Winona*, 155 U.S. 286 (1894), the device was an agricultural machine and lacked the support necessary for the board which was an element of the claim. The Supreme Court, said, "**True that it is necessary and true it is not in the claim but it does not have to be; the claim does not have to include everything that is required to operate.**"
>
> The other case is *Special Equipment v. Coe*, 324 U.S. 370, 64 USPQ 525 (1945), in which a sub combination claim was supported which related to a machine for cutting, peeling and coring pears, and there was no cutting knife involved in the claim. The Supreme Court said **it is perfectly all right; you do not have to have everything required to operate this device in the claim. Completeness is a much-inflated "bugaboo" which is mainly of interest to certain examiners in the Patent Office, and should not really concern them.** The claim is not a description of the device in any case. It is like a fingerprint which identifies the device. The fingerprint looks not at all like the person, but it is an identification of the person, and that is what we are interested in - identification.

Moreover, "that claims are interpreted in light of the specification does not mean that everything in the specification must be read into the claims." *Ratheon Co. v. Roper Corp.*, 724 F.2d 951, 957, 220 USPQ 592, 597 (Fed. Cir. 1983), *cert. Denied*, 469 U.S. 835 (1984). Claims 2-3, 6-16, 22-23 and 26-35 are clear, definite, complete and capable of being understood. The present case is a non-chemical case and the breadth of Claims 2-3, 6-16, 22-23 and 26-35 is permitted by the prior art. Accordingly, in light of the above arguments, the Examiner's indefiniteness rejection is improper. Accordingly, the 35 U.S.C. 112, second paragraph, rejection of Claims 2-3, 6-16, 22-23 and 26-35 must be withdrawn.

2) Claims 1-3, 6-7, 21-23 and 26-27 stand rejected under 35 U.S.C. 102(b) as being anticipated by Simon et al (GB 2230627). Applicants respectfully traverse this rejection, as set forth below.

In order that the rejection of Claims 1-3, 6-7, 21-23 and 26-27 be sustainable, it is fundamental that "each and every element as set forth in the claim be found, either expressly or inherently described, in a single prior art reference." *Verdegall Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). See also, *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989), where the court states, "The identical invention must be shown in as complete detail as is contained in the ... claim".

Furthermore, "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Independent Claim 1 requires and positively recites a discrete time **analog** filter comprising **a cascade of single pole IIR filters configured** to generate an output signal in response to an input signal.

Independent Claim 21, as amended, requires and positively recites a receiver front-end comprising **a cascade of single pole IIR analog filters configured** to generate an output signal in response to an input signal.

In contrast, Simon et. al (GB 2230627) discloses a recursive processor (like a microprocessor) for DIGITAL infinite impulse response (IIR) filters. It would be obvious to anyone skilled in art that digital implementations of filters **do not teach analog implementations**, since digital implementations deal with abstraction of information as bits and words and are based on a uni-directional flow of information, while analog filters implementation deal with manipulation of analog quantities with passive and active elements. The present invention provides a solution to an analog problem of implementing high order passive analog IIR filter embedding a mixer. The detailed description of the

mixer operation is presented in U.S. Pub. No. US 2003/0035499 A1. As such, Simon et al fails to teach or suggest all of the limitations of Claims 1 and 21.

In the Office Action dated October 21, 2005, the Examiner determined:

> The arguments are not persuasive because it is biased the limitation which is not recited in the rejected claims. There is nothing recited in the rejected claims about the implement solution or analog filter implementation. The phrase "A discrete time analog filters" on line 1 of claim 1 **is recited in the preamble so that it is not given any patentable weight** – thus the limitation "a cascaded single pole IIR filters" remains readable in the Simmon et al reference and Lee reference (Office Action dated October 21, 2005, page 4, lines 9-14).

Applicants respectfully submit that the Examiner has erred by not giving patentable weight to the preamble in Claim 1, for the reasons set forth below.

The determination of whether a preamble limits a claim is made on a case-by-case basis in light of the facts in each case; there is no litmus test defining when a preamble limits the scope of a claim. *Catalina Mktg. Int'l v. Coolsavings.com, Inc.*, 289 F.3d 801, 808, 62 USPQ2d 1781, 1785 (Fed. Cir. 2002). See *id.* at 808-10, 62 USPQ2d at 1784-86 for a discussion of guideposts that have emerged from various decisions exploring the preamble's effect on claim scope, as well as a hypothetical example illustrating these principles.

"[A] claim preamble has the import that the claim as a whole suggests for it." *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 620, 34 USPQ2d 1816, 1820 (Fed. Cir. 1995). "If the claim preamble, when read in the context of the entire claim, **recites limitations of the claim**, or, if the claim preamble is **'necessary to give life, meaning, and vitality' to the claim, then the claim preamble should be construed as if in the balance of the claim.**" *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165-66 (Fed. Cir. 1999). See also *Jansen v.*

*Rexall Sundown, Inc.*, 342 F.3d 1329, 1333, 68 USPQ2d 1154, 1158 (Fed. Cir. 2003)(In considering the effect of the preamble in a claim directed to a method of treating or preventing pernicious anemia in humans by administering a certain vitamin preparation to "a human in need thereof," the court held that the claims' recitation of a patient or a human "in need" gives life and meaning to the preamble's statement of purpose.). *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951) (A preamble reciting "An abrasive article" was deemed essential to point out the invention defined by claims to an article comprising abrasive grains and a hardened binder and the process of making it. The court stated "it is only by that phrase that it can be known that the subject matter defined by the claims is comprised as an abrasive article. Every union of substances capable *inter alia* of use as abrasive grains and a binder is not an 'abrasive article.'" Therefore, the preamble served to further define the structure of the article produced.).

**Any terminology in the preamble that limits the structure of the claimed invention must be treated as a claim limitation**. See, e.g., *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989) (The determination of whether preamble recitations are structural limitations can be resolved **only on review of the entirety of the application "to gain an understanding of what the inventors actually invented and intended to encompass by the claim.**"); *Pac-Tec Inc. v. Amerace Corp.*, 903 F.2d 796, 801, 14 USPQ2d 1871, 1876 (Fed. Cir. 1990) (determining that preamble language that constitutes a structural limitation is actually part of the claimed invention). See also *In re Stencel*, 828 F.2d 751, 4 USPQ2d 1071 (Fed. Cir. 1987). (The claim at issue was directed to a driver for setting a joint of a threaded collar*>;< however>,< the body of the claim did not directly include the structure of the collar as part of the claimed article. The examiner did not consider the preamble, which did set forth the structure of the collar, as limiting the claim. The court found that the collar structure could not be ignored. While the claim was not directly limited to the collar, the collar structure recited in the preamble did limit the structure of the driver. "[T]he framework - the teachings of the prior art - against which patentability is measured

is not all drivers broadly, but drivers suitable for use in combination with this collar, for the claims are so limited." Id. at 1073, 828 F.2d at 754.).

Being that the novelty of the present invention is directed to a discrete time ANALOG filter, versus prior art digital filters, for a cascade of single pole IIR filters configured to generate an output signal in response to an input signal, the terminology "discrete time ANALOG filter", limits the structure of the claimed invention and must be treated as a claim limitation. See, e.g., *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989). This is especially relevant since anyone skilled in art would know that digital implementations of filters do not teach analog implementations, since digital implementations deal with abstraction of information as bits and words and are based on a uni-directional flow of information, while analog filters implementation deal with manipulation of analog quantities with passive and active elements. As such, Claims 1 and 21 are allowable under 35 USC 102(b) over Simon.

Claims 2-3, 6-7, 22-23 and 26-27 stand allowable as depending from allowable claims and including further limitations not taught or suggested by the references of record.

3) Claims 1, 6, 21 and 26 stand rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al (US 5,732,002). Applicants respectfully traverse this rejection, as set forth below.

In order that the rejection of Claims 1, 6, 21 and 26 be sustainable, it is fundamental that "each and every element as set forth in the claim be found, either expressly or inherently described, in a single prior art reference." *Verdegall Bros. v. Union Oil Co. of California*, 2

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In contrast, Lee also shows a digital filter implementation while the present invention relates to an analog filter implementation. The building blocks in one are entirely different from the building blocks in the other. In digital filters, there is no concept of "impedance" or "load", which, in an analog filter can completely change the properties (transfer function) of the filter. This phenomenon is further emphasized in the context of novelty. While, arguendo, it may be obvious in the field of digital design to cascade digital single-stage IIR filters for the benefit of stronger overall filtering, since the signal flow there is strictly uni-directional with no effects of the next stage on the previous stage, similar configuration in analog domain does not work. In analog domain, on the other hand, the signal flow is all-directional so that Kirchoff's laws are satisfied. Connecting a single-stage IIR filter with another one changes the loading environment in

both stages to the point where the desired higher-order transfer function can rarely be obtained.

The common method of achieving higher-order filtering in analog domain is to isolate the stages with active elements, such as amplifiers. The Examiner has cited no prior art that shows how to obtain higher order IIR filtering without having amplifiers or active stages in the circuit. As such, Simon et al fails to teach or suggest all of the limitations of Claims 1 and 21.

In the Office Action dated October 21, 2005, the Examiner determined:

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**Any terminology in the preamble that limits the structure of the claimed invention must be treated as a claim limitation**. See, e.g., *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989) (The determination of whether preamble recitations are structural limitations can be resolved **only on review of the entirety of the application "to gain an understanding of what the inventors actually invented and intended to encompass by the claim**."); *Pac-Tec Inc. v. Amerace Corp.*, 903 F.2d 796, 801, 14 USPQ2d 1871, 1876 (Fed. Cir. 1990) (determining that preamble language that constitutes a structural limitation is actually part of the claimed invention). See also *In re Stencel*, 828 F.2d 751, 4 USPQ2d 1071 (Fed. Cir.

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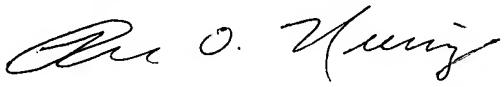
Claims 6 and 26 stand allowable as depending from allowable claims and including further limitations not taught or suggested by the references of record.

Applicants have amended objected to Claims 24-25 and 28-40 to be allowable. Applicants appreciate the Examiner's indication that Claims 4-5 and 8-20 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in the Office action and to include the limitations of the base claim and any intervening claims, but Applicants believe in light of the above arguments that Claims 4-5 and 8-20 are allowable in their present form. Accordingly, Applicants respectfully request allowance of the application as the earliest possible date.

Respectfully submitted,



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